

PUBLIC HEALTH REPORT

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A SHARP RISE in the incidence of malaria took place nationwide during 1966 with a total of 678 cases reported, more than four times that of 1965 and 12 times that of the record low in 1959. More than 700 cases were reported in the first four months of 1967.

This trend is reflected in the figures for California. There were 105 cases recorded in this State with onset in 1966, more than twice as many as in 1965 and 10 times as many as in 1960. In 1967 to date there have been more than 50 cases.

Of the 105 cases in 1966, 84 occurred in military personnel. The rest were in civilians, of which most were merchant seamen, Peace Corps volunteers and students returning from Africa, Asia and South America. Eighty of the 84 military personnel contracted the disease in Vietnam.

Among the 80 cases from Vietnam, the distribution of species of plasmodia is of significance: 53 *Plasmodium vivax*, 38 *P. falciparum* (malignant tertian), five mixed, one each *P. malariae* and *P. ovale*, and six unknown.

Indigenous malaria was eradicated from the United States following the initiation of the National Malaria Eradication Program, in 1947. Before that time the incidence of this disease had steadily declined from the latter part of the 19th century. Periodic resurgences occurred, mostly in the southeastern states, until the development and widespread use of effective insecticides, particularly DDT.

Records of the latter half of the 19th century describe malaria as a major public health problem in California, especially in the Central Valley. The first mosquito control work was begun in this state in 1903 at San Rafael. The State Legislature passed a Mosquito Abatement District Act in 1915. During the next 10 years the reported incidence of malaria declined from a case rate of 17.9 to 1.7 per 100,000 population.

While the natural transmission of malaria has been eliminated from the United States, the possibility of reintroduction will remain as long as the disease is present in other parts of the world. Civilian travel and military operations are exposing a substantial number of persons to malarious areas throughout the world. Modern transportation is so swift that often the first symptoms of the disease do not occur until after the person has returned to the United States.

Experience gained during and after World War II and the Korean conflict suggests that it is unlikely that the natural transmission of malaria will become reestablished in this country if the medical and allied professions remain alert to this possibility. Prevention depends upon effective surveillance (recognition and reporting of cases), prompt treatment of patients, and intensive abatement efforts against the mosquito vectors.

In the United States there have been only two documented episodes in the past 10 years of malaria acquired by mosquito transmission from a person who contracted the disease abroad. In both instances the organism was *P. vivax* and the first symptoms occurred in May 1966. The patients were siblings living in close proximity to military personnel returning from malarious areas in Asia and neither had a history of travel abroad or of blood transfusions. Transmission was probably by mosquito transmission from a person who had become infected in another country.

Delay in onset of primary attacks after transmission is a common occurrence with vivax malaria. Typical of *P. vivax* malaria is a longer period before symptoms occur, a longer interval between relapses and greater adaptation to temperature range within the United States, than with other forms. The interval between initial infection and primary attack may be as long as two years. Malaria due to *P. vivax* rarely persists longer than

four years and is not often fatal. Suppression of primary attacks and the treatment of either primary attacks or relapses are usually successful with chloroquine, mepacrine and primaquine.

During 1966 and 1967 an increasing number of cases of falciparum malaria (malignant tertian) have occurred among military personnel serving in Southeast Asia. As noted above, many persons with this severe type of the disease have come back from abroad. When caused by *P. falciparum*, the disease rarely persists longer than a year; however, the cerebral form of malaria may occur. The interval from transmission to initial symptoms is usually less than one month but it can be longer. Deaths have occurred in the United States among military personnel and civilians in the past year due to falciparum malaria which was recognized after return from Southeast Asia. The symptoms are often bizarre and include unexplained fever, delirium, irrational behavior, hypotension and shock. Early recognition and prompt therapy are essential.

Strains of *P. falciparum* which are resistant to chloroquine were discovered in 1961. At present a variable but significant number of cases of falciparum malaria are caused by strains resistant to most antimalarial drugs so that combinations of drugs are needed for treatment in many persons. For any form of malaria the outline of therapy contained in the American Public Health Association Report *Control of Communicable Diseases in Man*, Tenth Edition, 1965, contains a regimen most likely to be effective. For the suppression or prevention of malaria a combination of chloroquine diphosphate or sulfate (300 mg base) and primaquine (45 mg) each once weekly on the

same day and continued for eight weeks after leaving an endemic area will be successful for most persons. This will not suppress symptoms or prevent recrudescences in some instances of infection with *P. vivax* or resistant *P. falciparum* strains. Diaminodiphenylsulfone has recently shown promise for the prevention of both types of malaria when administered daily in conjunction with the weekly doses of chloroquine and primaquine.

With the continued rotation of military personnel from the Far East, more cases of malaria are expected to occur in California this year. Current information from mosquito abatement districts and other sources indicate a high mosquito density early in the year. In California the two species of anopheline mosquitoes capable of transmitting malaria are *A. freeborni* and *A. punctipennis*. Adult anophelines are found from June to October, primarily in the Central Valley and Sierra foothills from about Red Bluff on the north to Fresno on the south. A high sustained density of mosquito vectors, certain climatic conditions and the presence of cases of malaria could lead to transmission in California.

Malaria can also be acquired through blood transfusion. Two such cases, each due to *P. falciparum*, occurred during the past year. In both instances the donor was a returnee from Vietnam in whom the diagnosis of malaria became established after he had given blood for transfusion. One of these episodes occurred in Northern California.

Physicians should be aware of the increasing numbers and variable manifestations of malaria and keep the possibility of this in mind so that therapy can be begun early.

